

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Timothy K. Carns, Lee J. DeBruler, John L. Horvath, Michael J. Westphal

Assignee: Zilog, Inc.

Title: PROCESS TO IMPROVE HIGH PERFORMANCE CAPACITOR PROPERTIES IN INTEGRATED MOS TECHNOLOGIES

Serial No.: 09/351,544

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Examiner: Brock II, P.

Group Art Unit: 2815

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San Francisco, California

October 1, 2001

COMMISSIONER FOR PATENTS
Washington, D. C. 20231

RESPONSE TO OFFICE ACTION

Dear Sir:

These remarks are in response to the Office Action mailed on March 30, 2001, and for which a three-month extension is hereby requested. The Office Action rejected claims 1-42, claim 13 under 35 U.S.C. 102(a) as being anticipated by Watanabe (U.S. patent number 6,200,846-B1) and the remaining claims under 35 U.S.C. 103(a) with Watanabe as the primary reference. The present response is accompanied by a Declaration under 37 CFR 131 showing that the present invention as presented in the pending claims was conceived prior to the filing date of the Watanabe patent and diligently reduced to practice, thereby overcoming the rejections based upon this patent. This is discussed below under the appropriate headings and is followed by some additional comments on why the rejections are further believed to not be well founded.

Declaration under 37 CFR 131

Claims 1-42 were all rejected either under 35 U.S.C. 102(a) as being anticipated by Watanabe or under 35 U.S.C. 103(a) with Watanabe as the primary reference. The filing date of the Watanabe patent is December 15, 1998, less than one year prior to the filing date of the present application. The present Response is accompanied by a Declaration under 37 CFR 1.131 by one of the inventors named in the present application, Timothy K.

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Carns, and supporting documents showing that the invention of the present application as embodied in claims 1-42 was conceived prior to December 15, 1998, and diligently reduced to practice, thereby overcoming the rejection of these claims.

More particularly, the method of independent claim 1 describes a first embodiment of the present invention, independent claim 13 describes a second embodiment of the present invention, and independent claim 26 describes a third embodiment of the present invention. As presented in paragraphs 5-13 of the Declaration, the third embodiment was conceived and diligence toward a January 6, 1999, reduction to practice was begun from a date prior to December 15, 1998. Similarly, paragraphs 14-31 describe how the second and third embodiments were conceived and diligence to actually reduce them to practice began prior to December 15, 1998.

Dependent claims 2-12, 14-25, and 27-30 respectively have claims 1, 13, and 26 as their base claim. Claims 31-42 were added in the Amendment filed on February 5, 2001. These claims also relate to aspects of the first embodiment and were therefore conceived and diligently reduced to practice starting from a date prior to December 15, 1998. Therefore, the cited Watanabe patent is overcome by the Declaration.

Additional Comments

Additionally, it is respectfully submitted that the Office Action's rejections under 35 U.S.C. 103(a) are not well founded for a number of further reasons. These rejections state in a number of cases that certain things "would have been obvious", are "well know", or are "inherent". It is believed that Examiner is making a number of assumptions improperly based upon hindsight gained from the present application.

As described in the application and in the previous Amendment, the present invention is directed towards reducing the amount of leakage due to a non-insulating material between the plates between the plates of a capacitor formed as part of fabricating an integrated circuit, the particular non-insulating layer mainly considered being an anti-reflective layer. In an aspect of the present invention, solutions are presented for this problem that may be introduced into a process flow without having an effect on subsequent processing steps that depends on whether the capacitor formation portion of the process flow is included or not. None of the cited reference refer to this problem or incorporating solutions into it that leave the process flow unaltered.

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The Office Action combines different steps from different process flows in what is believed to be non-obvious ways based upon insights gained from the present application. It also states that specified values are either "inherent" or "obvious" when these values are often believed to be neither inherent nor obvious, but are instead based upon their incorporation into the process flow in a way that leaves it unaltered.

More specifically, with respect to claims 1 and 31, the Office Action refers to Watanabe's description of a prior art process¹ in Figures 5A-C for the formation of a "conformal insulating layer (106)" which is introduced at a different time and for a different purpose than in the present invention. The Office Action states that it would be obvious to rearrange this process as in present application. This is respectfully submitted to be in error. The cited reference provide no motivation for such a rearrangement that would involve reordering a number of processing states for which no reason is supplied. The Office Action also states that it is "inherent that a conformal insulating layer has a thickness in the range from 20Å to 700Å", when there appears to be no basis for this statement, this particular range being chosen for the reasons given above.

Furthermore, with respect to claims 2, 32, and 33, the Office Action is combining the embodiment of Figures 3c and 3d of Watanabe in a non-obvious way with the embodiment of Figures 3a-d used with respect to claims 1 and 31.

With respect to claims 40 and 41, it is again respectively submitted that the Office Action again is combining different embodiments of the Watanabe reference in a non-obvious way and drawing a number of improper conclusions. In particular, it states that these steps are such that the "process flow is unaltered" follows as a consequence, when this is non-obvious result for which there is no motivation provided in the prior art and which, further, is believed to be far from a natural consequence. Similarly, with respect to claims 16-20, 22, and 24 the Office Action again states that a number of different process steps are value ranges are either "obvious" or "inherent" when this is not believed to be either.

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Conclusion

For any of these reasons, reconsideration of the Office Action's rejection of claims 1-42, is therefore respectfully requested, and an early indication of their allowability is earnestly solicited.

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Respectfully submitted,

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